

Calcified Tissue Research

Volume 23 1977

Managing Editor **W. D. Armstrong, Minneapolis**

Associate Editors **O. L. M. Bijvoet, Leiden · E. Carafoli, Zürich**
D. H. Copp, British Columbia · E. D. Eanes, Bethesda
J. C. Elliott, London · H. Fleisch, Bern
W. S. S. Jee, Salt Lake City · L. Klein, Cleveland
J. L. Matthews, Dallas · A. W. Norman, Riverside
M. Owen, Oxford · A. M. Parfitt, Detroit
J. A. Parsons, London · L. G. Raisz, Farmington
J. J. Reynolds, Cambridge · R. G. G. Russell, Sheffield
L. Singer, Minneapolis · S. W. Stanbury, Manchester
G. Vaes, Brussels · A. Veis, Chicago
R. H. Wasserman, Ithaca · J. A. Weatherell, Leeds

Consulting Editors **A. Ascenzi, Rome · P. Bordier, Paris**
B. Engfeldt, Huddinge · B. A. Friedman, Cleveland
P. J. Gaillard, Leiden · A. Harell, Tel Aviv
F. Kuhlencordt, Hamburg · P. Meunier, Lyon
B. E. C. Nordin, Leeds · R. Schenk, Bern
D. B. Scott, Bethesda · K. M. Wilbur, Durham



Springer International

The exclusive copyright for all languages and countries, including the right for photomechanical and other reproductions, is transferred to the publisher.

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Alle Rechte, einschließlich das der Übersetzung in fremde Sprachen und das der fotomechanischen Wiedergabe oder einer sonstigen Vervielfältigung, vorbehalten. Jedoch wird gewerblichen Unternehmen für den innerbetrieblichen Gebrauch nach Maßgabe des zwischen dem Börsenverein des Deutschen Buchhandels e.V. und dem Bundesverband der Deutschen Industrie abgeschlossenen Rahmenabkommens die Anfertigung einer fotomechanischen Vervielfältigung gestattet. Wenn für diese Zeitschrift kein Pauschalabkommen mit dem Verlag vereinbart worden ist, ist eine Wertmarke im Betrage von DM 0,40 pro Seite zu verwenden.

Der Verlag läßt diese Beträge den Autorenverbänden zufließen.

Die Wiedergabe von Gebrauchsnamen, Handelsnamen, Warenbezeichnungen usw. in dieser Zeitschrift berechtigt auch ohne besondere Kennzeichnung nicht zu der Annahme, daß solche Namen im Sinne der Warenzeichen- und Markenschutz-Gesetzgebung als frei zu betrachten wären und daher von jedermann benutzt werden dürften.

Printed by Universitätsdruckerei H. Stürtz AG, Würzburg

Printed in Germany. — © by Springer-Verlag Berlin Heidelberg 1977

Contents

Abstracts of the 9th Annual Meeting of the Japanese Society for Bone Metabolism Research	189
Agarwal, P.N., s. Behari, J., et al.	113
Ascenzi, A., Bonucci, E., Ostrowski, K., Sliwowski, A., Dziedzic-Goclawska, A., Stachowicz, W., Michalik, J.: Initial Studies on the Crystallinity of the Mineral Fraction and Ash Content of Isolated Human and Bovine Osteons Differing in Their Degree of Calcification	7
Asteggiano, C.A., s. Cañas, F.M., et al.	297
Balsan, S., s. Sauveur, B., et al.	121
Balsan, S., s. Lieberherr, M., et al.	235
Balsan, S., s. Pavlovitch, H., et al.	277
Behari, J., Guha, S.K., Agarwal, P.N.: Absorption Spectra of Bone	113
Bergert, J.H., s. Meyer, J.L., et al.	83
Betts, F., s. Blumenthal, N.C., et al.	245
Birkedal-Hansen, H., Butler, W.T., Taylor, R.E.: Proteins of the Periodontium. Characterization of the Insoluble Collagens of Bovine Dental Cementum	39
Bitsensky, L., s. Dunham, J., et al.	77
Black, H.E., s. Rosenblum, I.Y., et al.	151
Blumenthal, N.C., Betts, F., Posner, A.S.: Stabilization of Amorphous Calcium Phosphate by Mg and ATP	245
Bonucci, E., s. Ascenzi, A., et al.	7
Boskey, A.L., Posner, A.S.: The Role of Synthetic and Bone Extracted Ca-Phospholipid-PO ₄ Complexes in Hydroxyapatite Formation	251
Briner, W.W., s. Francis, M.D., et al.	53
Butler, W.T., s. Birkedal-Hansen, H., et al.	39
Cañas, F.M., Ortiz, O.E., Asteggiano, C.A., Pereira, R.D.: Effects of <i>Solanum Malacoxylon</i> Extract on Rachitic Chicks; Comparative Study with Vitamin D ₃	297
Catterall, A., s. Dunham, J., et al.	77
Chayen, J., s. Dunham, J., et al.	77
Chiba, A., s. Oohira, A., et al.	271
Christner, P., Robinson, P., Clark, C.C.: A Preliminary Characterization of Human Cementum Collagen	147
Clark, C.C., s. Christner, P., et al.	147
Collins, G.M., s. Wuthier, R.E., et al.	135
Daimon, T.: The Presence and Distribution of Glycogen Particles in Chondrogenic Cells of the Tibiotarsal Anlage of Developing Chick Embryos	45
Dunham, J., Shedden, R.G., Catterall, A., Bitsensky, L., Chayen, J.: Pentose-Shunt Oxidation in the Periosteal Cells in Healing Fractures	77
Dziedzic-Goclawska, A., s. Ascenzi, A., et al.	7
Eanes, E.D., Meyer, J.L.: The Maturation of Crystalline Calcium Phosphates in Aqueous Suspensions at Physiologic pH	259
Ekstrand, J.: A Micro Method for the Determination of Fluoride in Blood Plasma and Saliva	225
Embery, G.: A Sulphated Glycopeptide in Human Supragingival Calculus Extracts	13
Fellot, C., s. Sauveur, B., et al.	121
Ferrell, J.F., s. Rosenblum, I.Y., et al.	151
Fisher, G., s. Humphreys, E.R., et al.	141
Fontaine, O., s. Pavlovitch, H., et al.	277
Francis, M.D., Slough, C.L., Briner, W.W., Oertel, R.P.: An in vitro and in vivo Investigation of Mellitate and Ethane-1-hydroxy-1,1-diphosphonate in Calcium Phosphate Systems	53
Garabedian, M., s. Sauveur, B., et al.	121
Garabedian, M., s. Lieberherr, M., et al.	235
Gay, C.V., s. Schraer, H.	185
Gay, C.V.: The Ultrastructure of the Extracellular Phase of Bone as Observed in Frozen Thin Sections	215
Goulding, A., McChesney, R.: Comparison of Effects of Parathyroidectomy and Ethane-1-Hydroxy-1,1-Diphosphonate (EHDP) Administration Upon Bone Synthesis of Hydroxyproline and Urinary Excretion of Hydroxyproline in Rats	115
Guha, S.K., s. Behari, J., et al.	113
Hansson, L.I., s. Sternström, A., et al.	161
Hausmann, E., s. Rowe, D.J.	283
Howlett, C.R., s. Owen, M., et al.	103
Hulth, A., s. Johnell, O.	241
Humphreys, E.R., Fisher, G., Thorne, M.C.: The Measurement of Blood Flow in Mouse Femur and Its Correlation with ²³⁹ Pu Deposition	141
Jee, W.S.S., s. Miller, S.C.	207
Johnell, O., Hulth, A.: Proliferation of Osteoclasts in Rat Bone Following Bleeding and Femoral Fractures	241
Kimmel, D., s. Villafañe, F., et al.	171
Lee, K.E., s. Meyer, J.L., et al.	83
Lieberherr, M., Pezant, E., Garabedian, M., Balsan, S.: Phosphatase Content of Rat Calvaria after in vivo Administration of Vitamin D ₃ Metabolites	235
Linde, A., Persliden, B.: Cathepsin D Activity in Isolated Odontoblasts	33
Lindgren, U., Mattsson, S.: The Reversibility of Disuse Osteoporosis. Studies of Bone Density, Bone Formation, and Cell Proliferation in Bone Tissue	179
Lopresti, C.A., s. Villafañe, F., et al.	171
Lowe, N.R., s. Robinson, C., et al.	19
Majeska, R.J., s. Wuthier, R.E., et al.	135
Malemud, C.J., s. Webber, R.J., et al.	61
Mattsson, S., s. Lindgren, U.	179
McChesney, R., s. Goulding, A.	115
Meyer, J.L., Lee, K.E., Bergert, J.H.: The Inhibition of Calcium Oxalate Crystal Growth by Multidentate Organic Phosphonates. Effect of pH	83
Meyer, J.L., s. Eanes, E.D.	259
Michalik, J., s. Ascenzi, A., et al.	7
Miller, S.C., Jee, W.S.S.: The Comparative Effects of Dichloromethylene Diphosphonate (Cl ₂ MDP) and Ethane-1-Hydroxy-1,1-Diphosphonate (EHDP) on Growth and Modeling of the Rat Tibia	207
Mongin, P., s. Sauveur, B., et al.	121
Negulesco, J.A.: Effects of Increased Earth Gravity and Estrogen Treatment on Intact and Healing Avian Radii	291
Nogami, H., s. Oohira, A., et al.	271
Norrdin, R.W., s. Villafañe, F., et al.	171
Oertel, R.P., s. Francis, M.D., et al.	53
Oohira, A., Tamaki, K., Terashima, Y., Chiba, A., Nogami, H.: Glycosaminoglycans in Congenital Pseudarthrosis	271
Ortiz, O.E., s. Cañas, F.M., et al.	297
Ostrowski, K., s. Ascenzi, A., et al.	7
Owen, M., Howlett, C.R., Triffitt, J.T.: Movement of ¹²⁵ I Albumin and ¹²⁵ I Polyvinylpyrrolidone through Bone Tissue Fluid	103
Owen, M., s. Triffitt, J.T.	303
Pavlovitch, H., Fontaine, O., Balsan, S.: Maintenance of a Calcemic Response to Parathyroid Hormone in D-Deficient Rats by the Prevention of Severe Hyperparathyroidism	277
Pereira, R.D., s. Cañas, F.M., et al.	297
Persliden, B., s. Linde, A.	33
Pezant, E., s. Lieberherr, M., et al.	235
Posner, A.S., s. Blumenthal, N.C., et al.	245
Posner, A.S., s. Boskey, A.L.	251

Rasmussen, P.: Calcium Deficiency, Pregnancy, and Lactation in Rats. Some Effects on Blood Chemistry and the Skeleton	87	Sternström, A., Hansson, L.I., Thorngren, K.-G.: Cortical Bone Remodeling in Normal Rat	161
Rasmussen, P.: Calcium Deficiency, Pregnancy, and Lactation in Rats. Microscopic and Microradiographic Observations on Bones	95	Tamaki, K., s. Oohira, A., et al.	271
Robinson, C., Lowe, N.R., Weatherell, J.A.: Changes in Amino-Acid Composition of Developing Rat Incisor Enamel	19	Taylor, R.E., s. Birkedal-Hansen, H., et al.	39
Robinson, P., s. Christner, P., et al.	147	Terashima, Y., s. Oohira, A., et al.	271
Rosenblum, I.Y., Black, H.E., Ferrell, J.F.: The Effects of Various Diphosphonates on a Rat Model of Cardiac Calciphylaxis	151	Thorne, M.C., s. Humphreys, E.R., et al.	141
Rowe, D.J., Hausmann, E.: Quantitative Analyses of Osteoclast Changes in Resorbing Bone Organ Cultures	283	Thorngren, K.-G., s. Sternström, A., et al.	161
Sauveur, B., Garabedian, M., Fellot, C., Mongin, P., Balsan, S.: The Effect of Induced Metabolic Acidosis on Vitamin D ₃ Metabolism in Rachitic Chicks	121	Timmins, P.A., Wall, J.C.: Bone Water	1
Schraer, H., Gay, C.V.: Matrix Vesicles in Newly Synthesizing Bone Observed after Ultracryotomy and Ultramicroincineration. Short Communication	185	Triffitt, J.T., s. Owen, M., et al.	103
Sela, J.: Bone Remodeling in Pathologic Conditions. A Scanning Electron Microscopic Study	229	Triffitt, J.T., Owen, M.: Preliminary Studies on the Binding of Plasma Albumin to Bone Tissue	303
Shedden, R.G., s. Dunham, J., et al.	77	Villafañe, F., Norrdin, R.W., Lopresti, C.A., Kimmel, D.: Bone Remodeling in Chronic Renal Failure in Perinatally Irradiated Beagles	171
Sliwowski, A., s. Ascenzi, A., et al.	7	Wall, J.C., s. Timmins, P.A.	1
Slough, C.L., s. Francis, M.D., et al.	53	Webber, R.J., Malemud, C.J., Sokoloff, L.: Species Differences in Cell Culture of Mammalian Articular Chondrocytes	61
Sokoloff, L., s. Webber, R.J., et al.	61	Weatherell, J.A., s. Robinson, C., et al.	19
Stachowicz, W., s. Ascenzi, A., et al.	7	Whitehouse, W.J.: Cancellous Bone in the Anterior Part of the Iliac Crest	67
		Wuthier, R.E.: Electrolytes of Isolated Epiphyseal Chondrocytes, Matrix Vesicles, and Extracellular Fluid	125
		Wuthier, R.E., Majeska, R.J., Collins, G.M.: Biosynthesis of Matrix Vesicles in Epiphyseal Cartilage. I. In vivo Incorporation of ³² P Orthophosphate into Phospholipids of Chondrocyte, Membrane, and Matrix Vesicle Fractions	135
		Indexed in Current Contents	

Subject Index

A

- Acid proteinase, odontoblasts 19-31
- Acidosis, metabolic, effects on vitamin D₃ metabolism 121-124
- Acromegaly 229-234
- Adsorption spectra, apatite 113-114
 - -, bone 113-114
 - -, collagen 113-114
- Albumen, ¹²⁵I labeled 103-112; 303-305
 - -, interaction with bone mineral 303-305
- Amino acids, in developing incisor enamel 19-31
- Amorphous calcium phosphate 245-250; 259-269
 - - -, conversion to crystalline calcium phosphate 259-269
 - - -, stabilization by Mg and ATP 245-250
- Amorphous mineral, in bone 215-223
- Ash, bone 7-11
 - , osteons 7-11
- ATP, stabilization of amorphous calcium phosphate by 245-250

B

- Bone, amorphous mineral 215-223
 - , appositional growth 161-170
 - , beagles, perinatally irradiated 171-178
 - , blood flow 141-145
 - , cancellous, in iliac crest 67-76
 - , cell proliferation 179-184
 - , cortical, normal remodeling 161-170
 - , crystallinity of mineral 7-11
 - , density 179-184
 - , electron spin resonance 7-11
 - , extracellular phase, ultrastructure 215-223
 - - -, observed by ultracyotomy and ultramicroincineration 215-223
 - , formation 179-184; 207-214
 - , homeostasis 1-5
 - , osteons, crystallinity 7-11
 - , remodeling, in pathosis 229-234
 - -, in renal failure 171-178
 - , resorption 171-178; 207-214; 283-289
 - , tissue fluid 103-112
 - , tumors 229-234
 - , water 1-5

C

- Calcification, odontoblasts 34-38
- Calcium, deprivation 87-94
 - -, effects on blood chemistry 87-94
 - -, effects on microstructure of bone 95-102
 - -, effects on the skeleton 95-102
 - -, homeostasis in 87-94
- Calcium oxalate, crystal growth 83-86
 - - - -, inhibition 83-86
- Calvaria, rat, effects of vitamin D₃ metabolites 235-239
- Cancellous bone, in iliac crest 65-76
- Cardiac calciphylaxis 151-159
- Cathepsin D, in odontoblasts 34-38
- Cementum, bovine 39-44
- Chick embryo, tibiotarsal anlage 45-51

Chondrocytes, articular 61-66

- , cell cultures 61-66
- , electrolytes 125-133
- , species differences 61-66
- Chondrogenic cells 45-51
 - -, glycogen in 45-51
- Collagen, in cementum 39-44; 147-150
 - , cyanogen bromide peptids 34-44; 147-150
- Collagen, Types I and III 39-44; 147-150
- Crystallinity of bone 7-11
 - , of osteons 7-11
- Calcium phosphate 125-133
 - -, adsorption of a albumin 103-112

D

- Dental calculus, inhibition 53-60
- Dentin, rat incisor 19-31
- Dentinogenesis 19-31
- Dermatan sulphate 271-275
- Dihydrotachysterol 151-159
- 1, 25-Dihydroxycholecalciferol 235-239
- 24, 25-Dihydroxycholecalciferol 235-239
- Diphosphonates 83-86; 151-159; 207-214
 - , effects on bone growth 207-214
 - , effects on bone remodeling 207-214
 - , effects on cardiac calciphylaxis 151-159
 - , effects on soft tissue calcification 151-159

E

- Electrolytes, epiphyseal 125-133
 - , chondrocytes 125-133
 - , extracellular fluid 125-133
 - , matrix vesicles 125-133
- Electron microscopy 45-51; 215-223
 - , microscopic scanning 65-76; 229-234
 - , spin resonance 7-11
- Enamel, developing 19-31
 - , amino acid composition 19-31
 - , dissection 19-31
 - , rat incisor 19-31
- Epiphyseal cartilage 125-133; 135-139
- Estrone, effect on normal and fractured bones 291-296
- Ethane-1-hydroxy-1, 1-diphosphonate (EHDP) 53-60; 83-86; 207-214
 - , effect on bone growth 207-214
 - , effect on bone remodeling 207-214
 - , effects on synthesis and excretion of hydroxyproline 115-119

F

- Fluoride, radioactive 141-145
 - , microdetermination 225-228
- Fractures, avian, callus 291-296
 - -, effects of estrone 291-296
 - -, effect of increased gravity 291-296
- Fractures, healing, periosteal cells in 77-81
 - , osteoclasts in 241-244
 - , effects on serum calcium and albumin 241-244

G

- Glucose 6-phosphate dehydrogenase 77-81
- Glutathione 77-81
- Glycogen 45-51
- Glycosaminoglycans, in pseudarthrosis 271-275
- Gravity, excess 291-296
 - -, effects on normal and healing bone 291-296

H

- Hydroxyapatite 303-305
 - , formation 251-258
 - -, initiation by Ca-phospholipid-PO₄ complexes 251-258
- Hydroxyproline, bone synthesis 115-119
 - , excretion 115-119
- Hyperparathyroidism, prevention 277-281
 - , secondary 171-178

I

- Iliac crest, cancellous bone in 65-67
 - , interpretations of biopsies 65-67
- Immobilization, osteoporosis produced by 179-184

L

- Lipopolysaccharides, effects on osteoclasts 283-289

M

- Magnesium, stabilization of amorphous calcium phosphate by 245-250
- Matrix vesicles 125-133
 - -, biosynthesis 135-139
 - -, newly synthesized 185-188
 - -, observed by ultracryotomy and ultramicroincineration 185-188
- Mellitic acid 53-60
- Multidentate organic phosphonates 83-86

N

- Nucleation poisoning 245-250

O

- Octacalcium phosphate 259-269
- Odontoblasts, isolated 33-38
 - , cathepsin D in 33-38
- Osteoclasts 241-244
 - , effects of bleeding and fractures 241-244
 - , proliferation 241-244
 - , effect of PTH in bone cultures 283-289
 - , quantification 283-289
- Osteoporosis 87-94; 95-102
 - , reversibility 179-184

P

- Parathyroid hormone, calcemic response in vitamin D deficiency 277-281
- Parathyroidectomy, effects on synthesis and excretion of hydroxyproline 115-119
- Pentose shunt oxidation, in periosteal cells 77-81
- Periodontium, bovine 39-44
- Periosteal cells, in healing fractures 77-81
- Phosphatase, acid, in calvaria 235-239
 - , alkaline, - 235-239
- Phospholipid metabolism 135-139
 - , incorporation of ³²P 135-139
- Pituitary 277-281
- Plasma fluoride, determination 225-228
 - , phosphate, effects of acidosis on 121-124
- Plutonium, deposition in bone 141-145
 - -, correlation with bone blood flow 141-145
- Polyvinylpyrrolidone, ¹²⁵I labeled 103-112
- Pregnancy, effects on blood chemistry and the skeleton 87-94
- Pseudarthrosis, glycosaminoglycans in 271-275

R

- Remodeling, normal cortical bone 161-170
- Renal failure, chronic 171-178
 - - -, effect on bone remodeling 171-178
- Rickets, chicks 297-301

S

- Saliva, fluoride, determination 225-228
- Solonom malacoxylon, effects compared with vitamin D₃ 297-301
 - -, effects on calcium absorption 297-301

T

- Tetracyclines 161-170; 171-178; 179-184

U

- Ultracryotomy 185-188; 215-223
- Ultramicroincineration 185-188; 215-223

V

- Vitamin D, deficiency, calcemic response to PTH 277-281
 - -, effect on retention of albumin by bone 103-112
 - -, effects of metabolic acidosis 121-124
 - -, metabolism 121-124
 - -, metabolites, effects on bone phosphatases 235-239
 - D₃, effects on rachitic chicks 297-301

W

- Water, bone, role 1-5
 - -, state in bone components 1-5
 - -, variations within a species 1-5

Advice to Authors

The illustrations that will appear in your contribution will be shown to best advantage if you follow the brief set of instructions below. Please read carefully. Thank you.

The Publisher

Preparation of Line Drawings

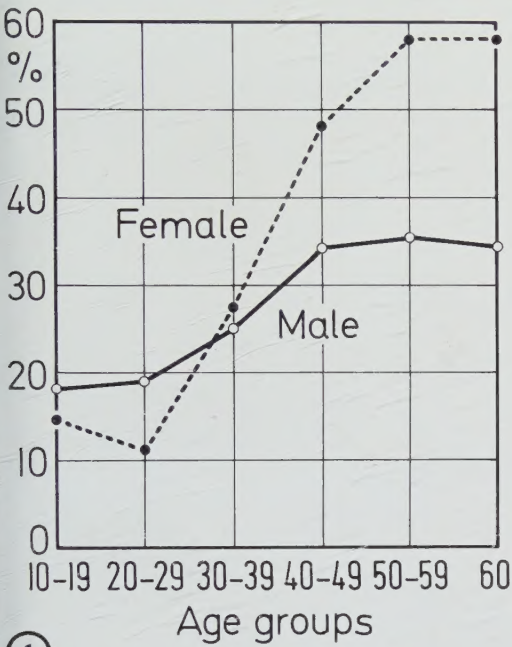
Illustration copy should be prepared to fit the format of the printed page (print area) so that 1 : 1 reproduction is possible. Where reduction is necessary, please state the desired scale.

Drawings are to be twice the final size and executed in indelible black ink.

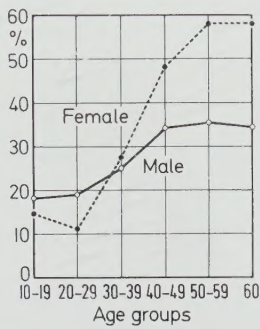
Important points to note: thickness of lines, size of inscriptions, size of measuring points, adequate spacing of shaded and dotted areas.

Words should be in upper and lower case characters, not CAPITALS.

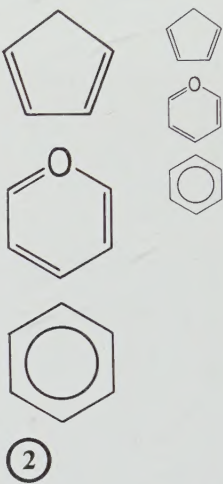
The following are optimal sizes as they appear in the journal:
Capital letters and numbers: 2 mm
Lower-case letters: 1.6 mm.



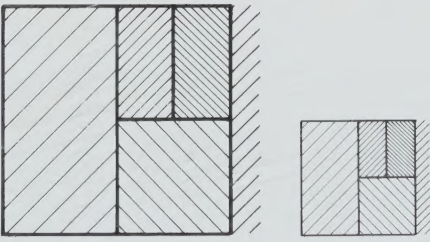
①



samples 1 to 5 show
the original size and
reduction $\times 50\%$



③



④

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890 1.5° III IV VIII IX ∞ % ≈
[(= - + x ÷ ! ? : " ' ,)] (A) (B) (a) (b)

⑤

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890 1.5° III IV VIII IX ∞ % ≈
[(= - + x ÷ ! ? : " ' ,)] (A) (B) (a) (b)

Selection of Illustration Material for Halftones (photographs, micrographs, X-rays, instrument traces etc.).

Photographs should be sharp, well-contrasted glossy prints of the original negative, trimmed at right angles. Halftone illustrations should be prepared to fit the format of the printed page (print area) so that 1 : 1 reproduction is possible. But if reduction is absolutely necessary, please state the desired scale.

Mark or crop marginal portions which are not required (at right angles, please).

Please see that illustrations that are to appear together are mounted accordingly as plates and that they correspond. Also they should not exceed the print area of the page, including room for the legend.

With X-rays, please indicate the significant parts on the back of the copy, or on an overlay.

Inscriptions, marks and scale lines should preferably be drawn neatly in black ink in an appropriate size on the face of the illustrations. Inscriptions should be about 3 mm high. Where Letraset is used, please handle it carefully and protect the photographs with an overlay.

